Developing Scientific Temper

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Among the several goals of education, the one that appeals to me the most is "Developing Scientific Temper". There could be several reasons for this - upbringing, the education that I received, the atmosphere at home and the fact that both my brother and sister are scientists of some repute, or could be the work environment in the organisation I worked in.

Watching my ten-month old grandson, Anurag, grow, and my recently spending a day at the "Science Mela" in Shorapur block in Karnataka, are two experiences that have made me think of this subject more seriously.

For Anurag, it is a whole new world. He has just learnt to walk independently, stand up, reach out, touch, put pressure on things, and before him lies a whole new world to be explored. It is absolutely amazing how he keeps repeating things tirelessly, saves his fingers from getting crushed, does not waste time in crying even if he falls quite badly, learns how to move knobs, understands what will start music and what will stop it, interestingly keeps shifting his attention to something new, and shows immense joy on his face when he causes the light to switch on or off, or the moment he encounters any new attraction. There are no pre-conceived notions, no *one* way of doing things, no resistance to absorb fresh facts that emerge out of a new experience.

The "Science Mela" in Shorapur was a different experience. It had the ingenuity of primary school children and their teachers in organizing several kinds of experiences for the 1500 children and their parents who participated in the "mela". It broke several commonplace myths and created fresh awareness about one's own existing knowledge and understanding. I, for one, had a notion that I had a very good sense of accurately judging weights. In one of the stalls, I was required to lift three different stones and guess the weight of the stones. I was crestfallen to know that all my guesses were nowhere near the actual weight of the stones. The science mela was a powerful example of how, by simple methods, awareness, interest and knowledge could be created at a mass scale through an event that is organized by the children and the teachers themselves. What appealed to me, was the difference the mela would create to the life of those children and teachers who organized it.

Scientific temper has been defined by several educationists, philosophers and scientists. Our Indian Constitution upholds the cultivation of scientific temper as one of the fundamental duties of citizens. Scientific temper is an attitude or a way of being that involves application of the mind, application of logical analysis, willingness to meet with new facts and evidence without pre-conceived notions, and willingness to question conclusions based on newer evidence. What does this entail or lead to? Necessarily an open mind, the ability to consider facts as they exist, discuss, debate, develop rationale, argue, analyse before concluding, and the willingness to live with the co-existence of several truths.

> *"Science is a way of thinking much more than it is a body of knowledge."*
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> *- Carl Sagan*

Even to an untrained mind, science automatically means knowledge, experiment, questioning, gathering of data, reason, something that is not mystical but can be proven, touched, felt, smelt, experienced, etc. Scientific temper would mean comfort with all the above and more. Very rightly, the distinction has often been made between "science" and "scientific temper". While science gives us knowledge, tells us the logic, provides an experience, explains why things exist the way they do, "scientific temper" would guide us on the constructive use of the knowledge, abilities and experiences that science equips us with. There is both wisdom and morality involved in the usage of knowledge. Thus, for instance, scientific temper would

lead to an attitude of “secularism” where you respect others' religious practices, rather than developing blind faith in a single religious practice and propagating that it is the only “right” way to practice religion.

There is no place for “superstition” and “blind faith in mythology” in the world of scientific temper. While mythological stories could be powerfully used to lead to virtual learning for young minds, forcing people to believe in stories that have no evidence is counterproductive to the process of forming a logical society. This can also be extended to learning history where one has to seek evidence, examine the same, connect to several other frames and conclude reliably as to what would have happened during a certain period rather than resorting to ambiguous interpretations based on one's own belief of what must have happened.

I would go the extent of saying that scientific temper has greater implications for the broader way in which society and human beings think, respond, and conduct themselves, than its implications for science itself. A doctor, for instance, may be a great scientist but cannot be considered as having scientific temper if he/she does not meet patients on time and extorts disproportionate money for the treatment offered.

It beats me when I hear reputed science education institutions having politics based on caste, gender and several other illogical issues. One may recollect the two suicides not too long ago, at one of the leading institutes in the country - one for harassment, based on social backwardness and the other arising out of stress due to the unmarried status of the lecturer, where the parents were forcing marriage. These are reflective of the need for the development of a “scientific temper” in society at large. How do we, in the twenty-first century still discriminate based on caste, creed, religion, gender, marital status and economic status of a person? Why don't we accept that marriage is a personal choice and that standard norms for a 'marriageable age” should not have any place in current modern society? Scientific temper plays a major role in questioning status quo, breaking stereotypes and establishing practices that meet the current needs of society.

To me, scientific temper is accepting newer methods of thinking, continuous questioning, being open to accepting that your own experiences, views, and conclusions need continuous re-calibration, and breaking stereotypes. It is about our ability to say “I don't know”. A truly scientific attitude should make us tolerant, break artificial barriers of caste, religion, political and geographical boundaries, and enable us to be self-reliant to the extent that we have the courage to change ourselves at any phase in life.

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I asked

"Although I have asked you many a thing,
Dear sphinx, my mind is still spinning
With many more questions I would like to ask,
Do you think you would find it too big a task?

'My child,' the sphinx said, 'I will certainly try
To help you understand the reasons why
The things you ask keep happening,
But for that we will have another meeting.

'Until then, however, remember one thing,
It is more important to be questioning,
Than it is to know the answer why
Things happen as they do, but try!'

An extract from the book, “I Wonder Why” (ISBN 81-7011-937-5), Pg. 88, authored by Neeraja Raghavan, and published by Children's Book Trust, New Delhi.